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CLAIMS

1 A method for protecting a MEMS structure during a dicing of a MEMS wafer to
2 produce individual MEMS dies, comprising the steps of:

3 (a) preparing a MEMS wafer having a plurality of MEMS structure sites thereon;

4 (b) mounting, upon the MEMS wafer, a wafer cap to produce a laminated MEMS wafer,
5 the wafer cap being recessed in areas corresponding to locations of the MEMS structure sites on
6 the MEMS wafer; and

7 (c) dicing the laminated MEMS wafer into a plurality of MEMS dies.

1 2. The method as claimed in claim 1, wherein the laminated MEMS wafer is diced using
2 a saw.

1 3. The method as claimed in claim 1, wherein the laminated MEMS wafer is diced using
2 a laser.

1 4. The method as claimed in claim 1, wherein the laminated MEMS wafer is diced using
2 scribing and breaking.

1 5. The method as claimed in claim 1, wherein the wafer cap is a cover tape with an
2 adhesive medium.

1 6. The method as claimed in claim 1, wherein the wafer cap includes an adhesive
2 medium.

1 7. The method as claimed in claim 6, wherein the adhesive medium is an ultraviolet light
2 releasable medium.

1 8. The method as claimed in claim 6, wherein the adhesive medium is a heat releasable
2 medium.

1 9. The method as claimed in claim 6, wherein the adhesive medium is a combination of
2 an ultraviolet light and heat releasable medium.

1 10. The method as claimed in claim 6, wherein the adhesive medium comprises a
2 thermoplastic organic material.

1 11. The method as claimed in claim 6, wherein the adhesive medium comprises an
2 ultraviolet light sensitive organic material.

1 12. The method as claimed in claim 6, wherein the adhesive medium comprises a solder
2 material.

A 1 13. The method as claimed in claim 1, wherein the wafer cap is attached to the MEMS
2 wafer through mechanical means.

1 14. The method as claimed in claim 1, wherein the wafer cap is attached to the MEMS
2 wafer through bonds produced by applying the wafer cap to the MEMS wafer with a
3 predetermined amount of pressure.

1 15. The method as claimed in claim 1, further comprising the step of:
2 (d) applying a contiguous tape on a backside of the MEMS wafer, the backside of the
3 MEMS wafer being a side opposite of a side having the MEMS structure sites located thereon.

1 16. The method as claimed in claim 15, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer after the wafer cap is mounted on the MEMS wafer.

1 17. The method as claimed in claim 15, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer before the wafer cap is mounted on the MEMS wafer.

1 18. The method as claimed in claim 15, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer before the laminated MEMS wafer is sawn.

1 19. The method as claimed in claim 15, wherein the contiguous tape is not cut when the
2 laminated MEMS wafer is diced.

1 20. The method as claimed in claim 5, further comprising the step of:
2 (d) applying a contiguous tape on a backside of the MEMS wafer, the backside of the
3 MEMS wafer being a side opposite of a side having the MEMS structure sites located thereon.

1 21. The method as claimed in claim 20, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer after the wafer cap is mounted on the MEMS wafer.

1 22. The method as claimed in claim 20, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer before the wafer cap is mounted on the MEMS wafer.

1 23. The method as claimed in claim 20, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer before the laminated MEMS wafer is sawn.

1 24. The method as claimed in claim 20, wherein the contiguous tape is not cut when the
2 laminated MEMS wafer is diced.

1 25. The method as claimed in claim 1, wherein the wafer cap comprises silicon-based
2 material.

1 26. The method as claimed in claim 25, wherein the wafer cap includes an organic
2 adhesive medium.

1 27. The method as claimed in claim 1, wherein the wafer cap comprises a glass-based
2 material.

1 28. The method as claimed in claim 1, wherein the wafer cap comprises a ceramic-based
2 material.

1 29. The method as claimed in claim 1, wherein the wafer cap comprises a polymer-based
2 material.

1 30. The method as claimed in claim 1, wherein the laminated MEMS wafer is diced with
2 a wafer saw with a wafer cap side of the laminated MEMS wafer facing towards a cutting device
3 of the wafer saw such that the wafer cap is sawn before the MEMS wafer.

1 31. A method for protecting a MEMS structure during a production of individual MEMS
2 dies, comprising the steps of:

3 (a) fabricating a MEMS wafer having a plurality of MEMS structure sites thereon;

4 (b) fabricating a wafer cap;

5 (c) bonding the wafer cap to the MEMS wafer to produce a laminated MEMS wafer, the
6 wafer cap being recessed in areas corresponding to locations of the MEMS structure sites on the
7 MEMS wafer;

8 (d) dicing the laminated MEMS wafer into a plurality of MEMS dies; and

9 (e) removing the wafer cap from the laminated MEMS wafer.

1 32. The method as claimed in claim 31, further comprising the step of:

2 (f) removing individual dies from the diced laminated MEMS wafer before the wafer cap
3 is removed from the laminated MEMS wafer.

1 33. The method as claimed in claim 31, further comprising the step of:

2 (f) mounting dies from the diced laminated MEMS wafer into a package before the wafer
3 cap is removed from the laminated MEMS wafer.

1 34. The method as claimed in claim 31, further comprising the step of:

2 (f) mounting dies from the diced laminated MEMS wafer into a package after the wafer
3 cap is removed from the laminated MEMS wafer.

1 35. The method as claimed in claim 31, further comprising the steps of:

2 (f) removing individual dies from the diced laminated MEMS wafer before the wafer cap
3 is removed from the laminated MEMS wafer; and

4 (g) mounting the dies removed from the diced laminated MEMS wafer into a package
5 before the wafer cap is removed from the laminated MEMS wafer.

1 36. The method as claimed in claim 31, wherein the wafer cap includes an adhesive
2 medium.

1 37. The method as claimed in claim 36, wherein the adhesive medium is an ultraviolet
2 light releasable medium.

1 38. The method as claimed in claim 36, wherein the adhesive medium is a heat
2 releasable medium.

1 39. The method as claimed in claim 36, wherein the adhesive medium is a combination
2 of an ultraviolet light and heat releasable medium.

1 40. The method as claimed in claim 36, wherein the adhesive medium comprises a
2 thermoplastic organic material.

1 41. The method as claimed in claim 36, wherein the adhesive medium comprises an
2 ultraviolet light sensitive organic material.

1 42. The method as claimed in claim 36, wherein the adhesive medium comprises a solder
2 material.

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1 43. The method as claimed in claim 31, further comprising the step of:
2 (f) applying a contiguous tape on a backside of the MEMS wafer, the backside of the
3 MEMS wafer being a side opposite of a side having the wafer cap located thereon.

1 44. The method as claimed in claim 43, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer after the wafer cap is mounted on the MEMS wafer.

1 45. The method as claimed in claim 43, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer before the wafer cap is mounted on the MEMS wafer.

1 46. The method as claimed in claim 43, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer before the laminated MEMS wafer is sawn.

1 47. The method as claimed in claim 31, wherein the wafer cap comprises silicon-based
2 material.

1 48. The method as claimed in claim 31, wherein the wafer cap comprises a glass-based
2 material.

1 49. The method as claimed in claim 31, wherein the wafer cap comprises a ceramic-
2 based material.

1 50. The method as claimed in claim 31, wherein the wafer cap comprises a polymer-
2 based material.

1 51. The method as claimed in claim 31, wherein the laminated MEMS wafer is sawn on
2 a wafer saw with a wafer cap side of the laminated MEMS wafer facing towards a cutting device
3 such that the wafer cap is sawn before the MEMS wafer.

1 52. The method as claimed in claim 31, wherein the wafer cap is attached to the MEMS
2 wafer through mechanical means.

1 53. The method as claimed in claim 31, wherein the wafer cap is attached to the MEMS
2 wafer through bonds produced by applying the wafer cap to the MEMS wafer with a
3 predetermined amount of pressure.

1 54. A laminated MEMS wafer, comprising:
2 a MEMS wafer having a plurality of MEMS structure sites located thereon; and
3 a removable wafer cap;
4 said removable wafer cap being bonded to the MEMS wafer to produce a laminated
5 MEMS wafer, the wafer cap being recessed in areas corresponding to locations of the MEMS
6 structure sites on the MEMS wafer.

1 55. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap includes
2 a releasable adhesive medium.

1 56. The laminated MEMS wafer as claimed in claim 55, wherein the releasable adhesive
2 medium is an ultraviolet light releasable medium.

1 57. The laminated MEMS wafer as claimed in claim 55, wherein the releasable adhesive
2 medium is a heat releasable medium.

1 58. The laminated MEMS wafer as claimed in claim 55, wherein the releasable adhesive
2 medium is a combination of an ultraviolet light and heat releasable medium.

1 59. The laminated MEMS wafer as claimed in claim 55, wherein the releasable adhesive
2 medium comprises a thermoplastic organic material.

1 60. The laminated MEMS wafer as claimed in claim 55, wherein the releasable adhesive
2 medium comprises an ultraviolet light sensitive organic material.

1 61. The laminated MEMS wafer as claimed in claim 55, wherein the releasable adhesive
2 medium comprises a solder material.

1 62. The laminated MEMS wafer as claimed in claim 54, further comprising:
2 a contiguous tape applied on a backside of the MEMS wafer, the backside of the MEMS
3 wafer being a side opposite of a side having the MEMS structure sites located thereon.

1 63. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap
2 comprises silicon-based material.

1 64. The laminated MEMS wafer as claimed in claim 58, wherein the releasable adhesive
2 medium comprises an organic material.

1 65. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap
2 comprises a glass-based material.

1 66. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap
2 comprises a ceramic-based material.

1 67. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap
2 comprises a polymer-based material.

1 68. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap is
2 attached to the MEMS wafer through mechanical means.

1 69. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap is
2 attached to the MEMS wafer through bonds produced by applying the wafer cap to the MEMS
3 wafer with a predetermined amount of pressure.

1 70. A method for protecting a MEMS structure during a dicing of a MEMS wafer to
2 produce individual MEMS dies, comprising the steps of:

- 3 (a) preparing a MEMS wafer having a plurality of MEMS structure sites thereon;
4 (b) mounting, using an adhesive layer, a wafer cap, to produce a laminated MEMS wafer,
5 the wafer cap being recessed in areas corresponding to locations of the MEMS structure sites on
6 the MEMS wafer; and
7 (c) dicing the laminated MEMS wafer into a plurality of MEMS dies.

1 71. The method as claimed in claim 70, wherein the laminated MEMS wafer is diced
2 using a saw.

1 72. The method as claimed in claim 70, wherein the laminated MEMS wafer is diced
2 using a laser.

1 73. The method as claimed in claim 70, wherein the laminated MEMS wafer is diced
2 using scribing and breaking.

1 74. The method as claimed in claim 70, wherein the adhesive layer is an ultraviolet light
2 releasable medium.

1 75. The method as claimed in claim 70, wherein the adhesive layer is a heat releasable
2 medium.

1 76. The method as claimed in claim 70, wherein the adhesive layer is a combination of
2 an ultraviolet light and heat releasable medium.

1 77. The method as claimed in claim 70, wherein the adhesive layer comprises a
2 thermoplastic organic material.

1 78. The method as claimed in claim 70, wherein the adhesive layer comprises an
2 ultraviolet light sensitive organic material.

1 79. The method as claimed in claim 70, further comprising the step of:
2 (d) applying a contiguous tape on a backside of the MEMS wafer, the backside of the
3 MEMS wafer being a side opposite of a side having the MEMS structure sites located thereon.

1 80. The method as claimed in claim 75, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer after the wafer cap is mounted on the MEMS wafer.

1 81. The method as claimed in claim 75, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer before the wafer cap is mounted on the MEMS wafer.

1 82. The method as claimed in claim 70, wherein the wafer cap comprises silicon-based
2 material.

1 83. The method as claimed in claim 82, wherein the adhesive layer is an organic
2 adhesive medium.

1 84. The method as claimed in claim 70, wherein the wafer cap comprises a glass-based
2 material.

1 85. The method as claimed in claim 70, wherein the wafer cap comprises a ceramic-
2 based material.

1 86. The method as claimed in claim 70, wherein the wafer cap comprises a polymer-
2 based material.

kl 1 87. The method as claimed in claim 70, wherein the laminated MEMS wafer is diced
2 with a wafer saw with a wafer cap side of the laminated MEMS wafer facing towards a cutting
3 device of the wafer saw such that the wafer cap is sawn before the MEMS wafer.

1 88. The method as claimed in claim 70, wherein the adhesive layer is applied to the
2 MEMS wafer around the MEMS structure sites.

100006967-120501 1 89. The method as claimed in claim 70, wherein the adhesive layer is applied to the
2 wafer caps at non-recessed areas.

1 90. The method as claimed in claim 70, further comprising the step of:
2 (d) removing individual dies from the diced laminated MEMS wafer before the wafer cap
3 is removed from the laminated MEMS wafer.

1 91. The method as claimed in claim 70, further comprising the step of:
2 (d) mounting dies from the diced laminated MEMS wafer into a package before the wafer
3 cap is removed from the laminated MEMS wafer.

1 92. The method as claimed in claim 70, further comprising the step of:
2 (d) mounting dies from the diced laminated MEMS wafer into a package after the wafer
3 cap is removed from the laminated MEMS wafer.

1 93. The method as claimed in claim 70, wherein the wafer cap is a cover tape with an
2 adhesive medium.

1 94. The method as claimed in claim 93, further comprising the step of:
2 (d) applying a contiguous tape on a backside of the MEMS wafer, the backside of the
3 MEMS wafer being a side opposite of a side having the MEMS structure sites located thereon.

1 95. The method as claimed in claim 94, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer after the wafer cap is mounted on the MEMS wafer.

1 96. The method as claimed in claim 94, wherein the contiguous tape is applied to a
2 backside of the MEMS wafer before the wafer cap is mounted on the MEMS wafer.

1 97. The method as claimed in claim 1, wherein the wafer cap comprises a metal.

1 98. The method as claimed in claim 31, wherein the wafer cap comprises a metal.

1 99. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap
2 comprises a metal.

1 100. The method as claimed in claim 70, wherein the wafer cap comprises a metal.

1 101. The method as claimed in claim 1, wherein the wafer cap comprises a static
2 dissipative material.

1 102. The method as claimed in claim 31, wherein the wafer cap comprises a static
2 dissipative material.

1 103. The laminated MEMS wafer as claimed in claim 54, wherein the wafer cap
2 comprises a static dissipative material.

1 104. The method as claimed in claim 70, wherein the wafer cap comprises a static
2 dissipative material.

1 105. The method as claimed in claim 15, wherein the contiguous tape comprises a static
2 dissipative material.

1 106. The method as claimed in claim 20, wherein the contiguous tape comprises a static
2 dissipative material.

1 107. The method as claimed in claim 43, wherein the contiguous tape comprises a static
2 dissipative material.

1 108. The laminated MEMS wafer as claimed in claim 62, wherein the contiguous tape
2 comprises a static dissipative material.

1 109. The method as claimed in claim 79, wherein the contiguous tape comprises a static
2 dissipative material.

1 110. The method as claimed in claim 94, wherein the contiguous tape comprises a static
2 dissipative material.

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